

WHAT IS CLAIMED IS:

1. An ultrasonic-wave propagation-time measuring method in which an ultrasonic wave is transmitted by use of an ultrasonic element, a reflection wave of the transmission wave is received as a reception wave by use of the same ultrasonic element or a different ultrasonic element, and a period of time between transmission of the ultrasonic wave and reception of the reception wave is measured as a propagation time, the method comprising:

 a reference-value setting step which comprises subjecting a reception wave to full-wave rectification to obtain a full-wave-rectified wave, integrating the full-wave-rectified wave or a portion thereof in order to obtain an integral value, and setting a reference value on the basis of the integral value; and

 a propagation time measurement step which comprises determining an arrival time of the reception wave by use of the reference value when the propagation time is measured.

2. The ultrasonic-wave propagation-time measuring method as claimed in claim 1, which comprises measuring a point in time when the reception wave or the full-wave-rectified wave has reached the reference value measured as an arrival time in the propagation time measurement step.

3. The ultrasonic-wave propagation-time measuring method as claimed in claim 1, which comprises integrating the reception wave or full-wave-rectified wave or a portion thereof to obtain an integral value, and measuring a point in time when the integration value has reached the reference value as an arrival time in the propagation time measurement step.

4. A gas concentration sensor which utilizes the ultrasonic-wave propagation-time measuring method as claimed in claim 1.

5. A gas concentration sensor which utilizes the ultrasonic-wave propagation-time measuring method as claimed in claim 2.

6. A gas concentration sensor which utilizes the ultrasonic-wave propagation-time measuring method as claimed in claim 3.

7. The gas concentration sensor as claimed in claim 4, wherein the sensor is used for measurement of gas concentration within an intake pipe or canister purge line of an internal combustion engine.

8. The gas concentration sensor as claimed in claim 5, wherein the sensor is used for measurement of gas concentration within an intake pipe or canister purge line of an internal combustion engine.

9. The gas concentration sensor as claimed in claim 6, wherein the sensor is used for measurement of gas concentration within an intake pipe or canister purge line of an internal combustion engine.